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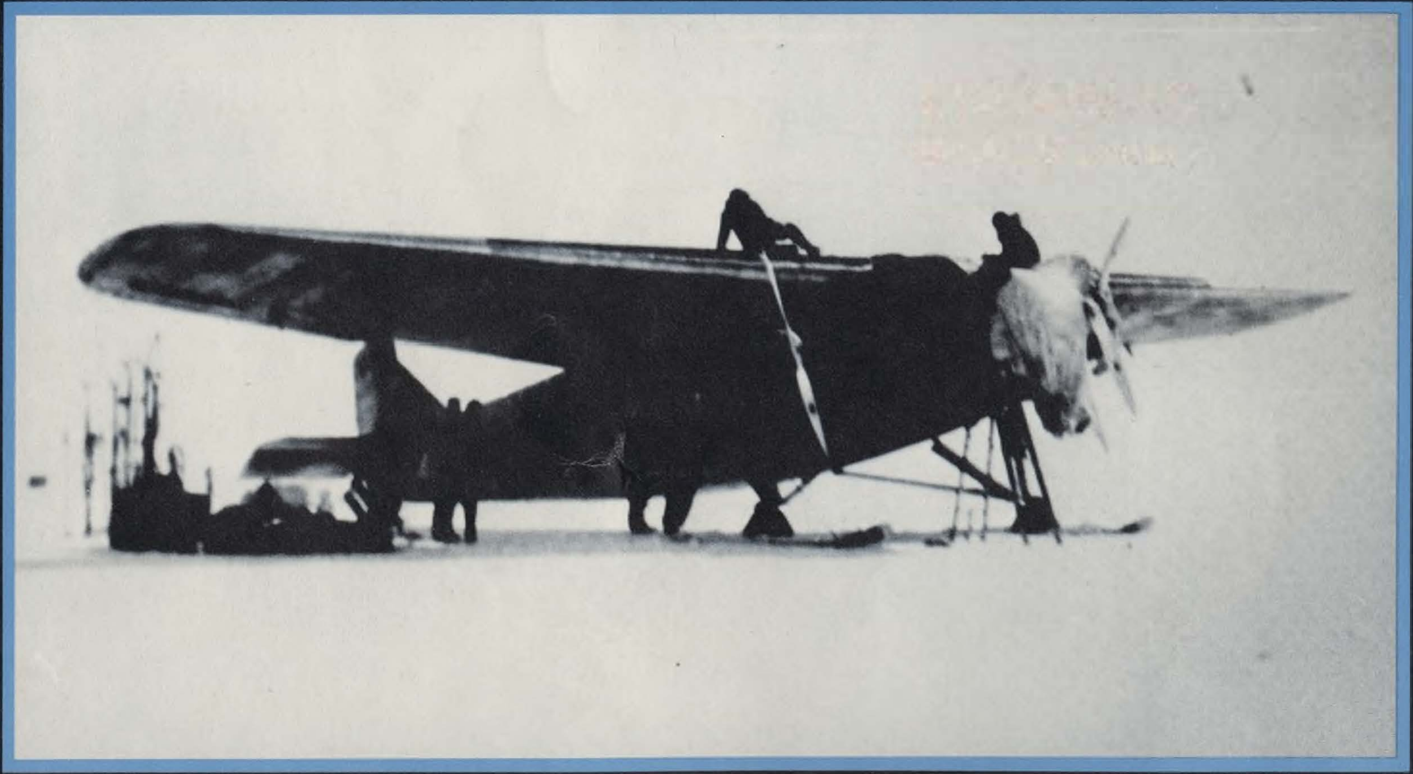
FLIGHT TO THE SOUTH POLE

The New Age of Antarctic Exploration and Research



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The orange-tailed LC -130R transport, 4,500-horsepower turboprops winding full-out, gathers speed and smoothly lifts off the ice runway of McMurdo Station. Scientists and technicians concentrate on their instruments as the airplane cruises at 300 miles per hour over the white vastness of the Antarctic. This is the National Science Foundation's flying laboratory—filled with sophisticated sensing equipment. From this plane scientists measure the thickness of the antarctic ice sheet and trace the terrain which lies far below. They sample concentrations of ozone, water vapor, and aerosols in the atmosphere. Their sensors measure winds, latitude, longitude, magnetic fields, and other data which are automatically recorded on nine-track computer-compatible tape. Airborne science is routine here.

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At 3:29 p.m. on November 28, 1929, some 50 years ago, a heavily laden Ford Trimotor bounced down the rough ice runway of "Little America" and clawed its way through an antarctic overcast—embarking on an epic flight that was anything but routine.

The little plane, called the Floyd Bennett, weighed only 6,000 pounds. With its four man crew, extra gasoline, food, and survival gear, it was carrying more than seven tons. The plane's three engines put out 975 horsepower. Cruise speed—just over 100 miles per hour. For navigating the trackless wastes there were two drift meters and a sun-compass. Aside from a temperature/humidity/pressure recorder, the sole "scientific" instrument aboard was a bulky 100-pound aerial camera.

Eighteen hours and 37 minutes (and 1,600 miles) later, the Floyd Bennett touched back down on the Little America landing strip, mission completed. Richard E. Byrd and his crew were the first to conquer the South Pole by air. And their historic journey, the culmination of years of work and meticulous planning, had opened a new era of scientific exploration in the Antarctic.

Simply establishing the Little America base camp a year earlier was a logistics triumph. Byrd's men unloaded and hauled several hundred tons of food, fuel, and equipment (including three airplanes) over the crumbling ice barrier on dog sleds. The dismantled all-metal Ford Trimotor was stored that winter in a hangar made of snow blocks.

After the long months of antarctic darkness set in, Byrd and his companions began final planning for their aerial assault on the South Pole. The 1,600-mile flight, Byrd wrote, "involved unprecedented features . . . For hundreds of miles we would fly over a barren, rolling surface; then climb a mountain rampart 14,000 feet high, with a 10,500-foot pass, and continue our journey across a 10,000-foot plateau. Factors of speed, horsepower, rate of climb, and other engineering problems entailed endless hours of complicated calculations. I don't think I ever before saw so many pages covered with figures."

Excavated from its snow cave in early November, the Floyd Bennett was reassembled in temperatures that reached 50° below zero. The plane, named for Byrd's late companion on his North Pole flight, worked perfectly. As the men waited anxiously for the weather to clear, the weightload of the aircraft was figured to the last ounce.

Without aerial photographer Ashley McKinley and his equipment and survival gear (a total of 600 pounds), the plane could fly to the South Pole and back with no problem. But to Byrd, McKinley's presence

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was crucial. "We planned a photographic record of every mile of the 1,600 miles over which we were to fly," he recalled. "There would be available to science practically all we could see. This permanent record was to me the achievement of the flight."

Since the extra weight would make a nonstop trip impossible, it would be necessary to cache gasoline and food near the base of the mountain range that bordered the high antarctic plateau. The aircraft would then be able to land and refuel during the return leg of the flight. Even so, the weight and fuel consumption calculations were crucial. The Floyd Bennett had to be light enough by the time it reached the Queen Maud Mountains to climb to 11,000 feet and slip through the pass at the head of the Axel Heiberg glacier.

On November 19, Byrd and his crew flew some 400 miles to reconnoiter the jagged, glacier-punctuated mountain barrier; then landed to establish their forward camp. There was nothing left to do but wait for the clear skies that were necessary to both locate the South Pole and return through the gap in the mountains to Little America. On November 28, a geological party under Dr. Laurence Gould radioed that the weather over the mountains was excellent. Byrd's meteorologist at the camp agreed that "another chance may not come." So at 3:29 that afternoon, the Floyd Bennett headed south toward the Pole. Byrd was navigating. Bernt Balchen piloted the aircraft. Harold June was co-pilot and radio operator. And McKinley and his bulky camera completed the crew.

Aerial photographer Ashley McKinley, left, Cmdr. Richard E. Byrd, center, and Dr. Laurence Gould, geologist and second in command of the first Byrd Antarctic Expedition, examine photographs of the terrain over which the Floyd Bennett flew on its historic mission.

As the plane neared the Axel Heiberg glacier with its 10,500-foot pass, the men sighted another glacier to the right which seemed low enough and wide enough to cross. The decision had to be made quickly, wrote Byrd: "Should we tackle Axel Heiberg, altitude known, both width and air currents unknown? The bordering peaks might be so high that the currents they created would dash us to the ground, hovering as we were near the absolute ceiling of our plane. Or should we take the unknown glacier, which looked feasible?"

Byrd opted for the unknown glacier. As powerful air currents "jostled and tossed the plane about like a cork in a washtub," Balchen fought to gain altitude. Suddenly, the wheel turned loosely in his hands. The pass loomed ahead but the Floyd Bennett would go no higher. If gasoline were jettisoned, it would not be possible to reach the South Pole and return. If food were thrown overboard, all their lives would be endangered in case of a forced landing. "A bag of food overboard," ordered Byrd.

The plane responded immediately and slowly began to climb. Still, the fast approaching rim of the glacier was higher. Again, the controls went dead. Byrd gestured, and another 150-pound bag of food careened through the trapdoor of the aircraft. The

Floyd Bennett responded. Byrd reported that "those were the slowest minutes we ever spent. Finally we reached the pass. We ambled over—a few hundred yards to spare . . . No mountains ahead. A clear route to the pole, dead ahead on the horizon."

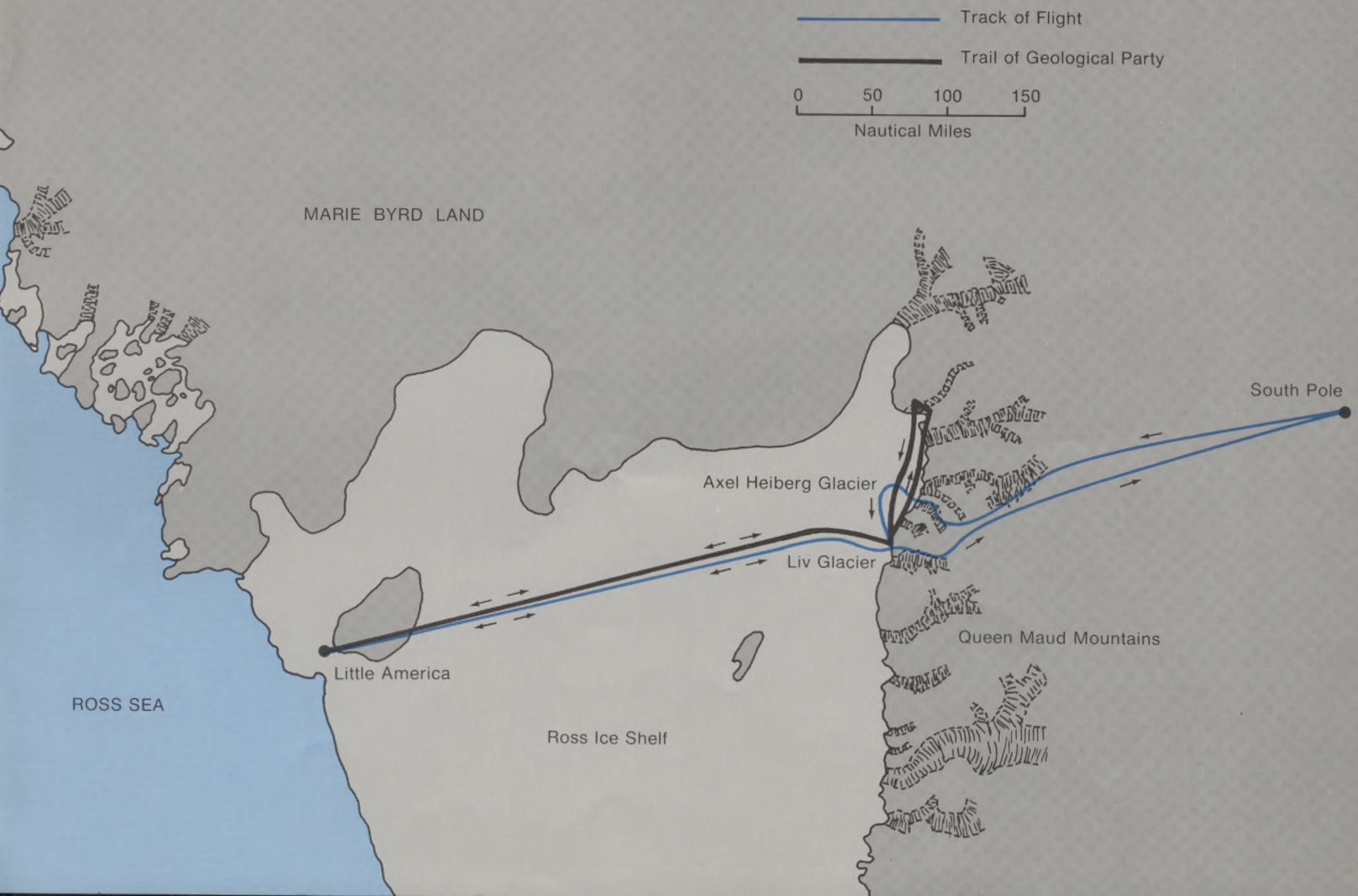
The vast antarctic plateau ranged from 11,000 to 7,000 feet, sloping toward the South Pole. Cruising at only 90 miles per hour against a brisk headwind, Byrd navigated carefully over the jumbled terrain with his sun-compass and drift indicators. From the start, McKinley had continuously been taking aerial photographs. Just after 12:30 a.m. on November 29, Byrd was able to "shoot the sun" with his sextant. The South Pole was dead ahead. At 1:14 a.m., he wrote, "the big moment had come! The imaginary point—the aloof and lonely bottom of the earth—was beneath us." The crew dropped an American flag, weighted with a stone from Floyd Bennett's grave at Arlington Cemetery.

Flying at 2,500 feet over the snow, Byrd directed the plane several miles to the right, then angled back on the original line of flight to cross again over the pole and make certain the feat was accomplished. At 1:25 a.m., the aircraft veered north toward Little America. Byrd's navigation was unerring. Several hours later the weary crew spotted the Axel Heiberg glacier in the distance. This time the lightened plane soared through the pass in the mountains with no difficulty.

After landing at their forward camp and taking on 200 gallons of fuel, Byrd and his men resumed the flight. At 10:10 a.m., the Floyd Bennett touched down at Little America. "We were deaf from the roar of the motors," according to Byrd, "tired from the strain of the flight, but we forgot all that in the tumultuous welcome of our companions."

The welcome echoed far beyond the cluster of huts at Little America. Congratulations poured in from all over the world (including messages from President Herbert Hoover and the Congress). Byrd was a national hero. His dramatic adventure had captured the imagination of millions of Americans. And Antarctica was etched on the national consciousness. The great surge of enthusiasm and interest generated private and government support for further expeditions which opened Antarctica to science.

Byrd and his companions flew across the Ross Ice Shelf, itself larger than Spain, then through the Queen Maud Mountains on their way to the South Pole. An advance geological party reported clear weather over the mountains for the flight.


Track of Flight
Trail of Geological Party
0
50
100
150
Nautical Miles
MARIE BYRD LAND
South Pole
Axel Heiberg Glacier
Liv Glacier
Queen Maud Mountains
Little America
ROSS SEA
Ross Ice Shelf

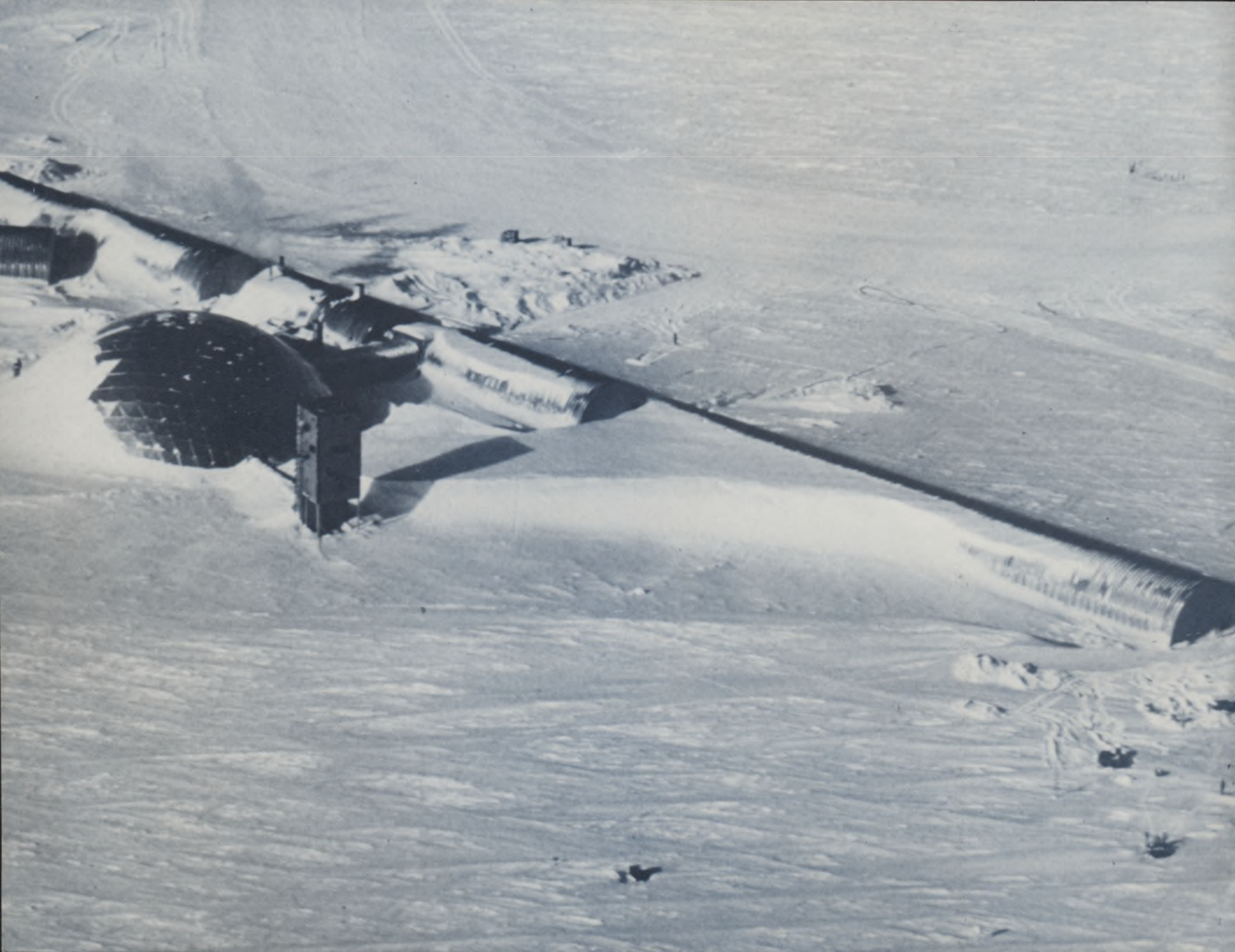
Today, the U.S. Antarctic Research Program (funded and coordinated by the National Science Foundation) has helped turn the bottom of the world into a vast scientific laboratory. There is a year-around U.S. research station at the South Pole itself, named after pioneer explorers Roald Amundsen and Robert Scott. It is supplied entirely by airplane. Some 730 miles to the north, the main American scientific outpost at McMurdo Sound is like a small town, complete with spacious and well-equipped geophysical and biological laboratories. U.S. scientists there and at three other American stations (including the South Pole) are carrying out a sweeping range of research in meteorology, geology, solid earth geophysics, upper atmosphere physics, glaciology, biology, and human physiology. Around the continent, oceanography is performed on ice-strengthened ships and on icebreakers.

Over the past two decades, the character of antarctic research has changed. Reconnaissance studies have largely been completed, and scientists are now investigating in depth the natural phenomena of the continent as well as the processes at work in the atmosphere, the ice mantle, and the southern ocean. The research is increasingly related to scientific and practical problems of global extent.

Studies of the massive antarctic ice sheet (over 5-million square miles) and the surrounding ice-covered oceans are adding to the understanding of world weather patterns and long-term climatic changes. Geologists are gathering information on the region's potential for mineral resources. New data on the phenomenon of continental drift are being generated by geophysical studies. Growing interest in the possible use of fish and krill resources adds significance to biological studies of life in the southern ocean. Upper atmosphere physicists have a unique opportunity, because of Antarctica's high geomagnetic latitude, to study the solar-stimulated waves and particles in the ionosphere and the magnetosphere.

Each year more than 300 scientists in the U.S. Antarctic Research Program conduct approximately a hundred different research studies. In the 1978-1979 season, together with scientists from three other nations, one U.S. team launched the first intensive investigation of the huge Darwin (10 miles wide) and Byrd (12 miles wide) glaciers which merge with the Texas-sized Ross Ice Shelf. What they are learning is not only helping them to determine whether a similar ice shelf existed in the Arctic some 18,000 years ago, but also why the great northern hemisphere ice sheet rapidly disintegrated 12,000 years ago. Such knowledge will provide a better understanding of past changes in world climate and indicate what climatic changes may occur in the future.

The crevassed surface of a broad unknown glacier, later named the Liv, slowly passed beneath the wings of the Floyd Bennett and its crew on the way to the South Pole. The photograph was one of a continuous series to record the terrain.



American glaciologists also joined with colleagues from other nations to study the East Antarctic ice sheet. A hole was drilled 2,925 feet into that ice mantle (one of the world's thickest). The hole was filled last year with a fluid to preserve it for future study. Researchers are analyzing the ice core to trace climate changes in Antarctica over the past 25,000 years.

Another team of scientists searched for rare types of meterorites which are well preserved in Antarctica's cold. Researchers studying emissions from Mount Erebus, a 12,450-foot active volcano, learned more about natural sources of mercury (adding to the knowledge of mercury as a pollutant).

Marine biologists focused on antarctic krill, a small shrimp-like crustacean that abounds in the southern ocean and could become an important new source of protein for humans. They investigated the larval development, lifespan, and growth rate of the tiny creature. Scientists also tagged and recaptured some 800 seals in McMurdo Sound to learn more of their movements, reproduction, and other habits. They want to know about all aspects of the ecosystem so that realistic harvesting limits can be set.

Researchers drilled three holes through the 1,300-foot-thick Ross Ice Shelf, so they could sample the water, sediments, and organisms underneath. In addition, they used television and still photography to record the animal life which exists in the dark, frigid waters beneath the ice.

The Amundsen-Scott South Pole Station, housing modern quarters and research facilities under its dome and arches, is the site of research in upper atmosphere physics, meteorology, trace contaminants, and other studies.

Physical oceanographers studied the interactions between glacial ice and seawater and the differences in water masses between the southern ocean depths and the continental shelves. They also deployed meteorological data buoys to gain a better understanding of how oceanic and atmospheric processes are related to ice conditions.

At the South Pole Station, scientists used new detectors to probe the sun's high-energy cosmic rays. Other researchers made optical observations at the Pole designed to measure surface motions on the sun which are caused by oscillations in its interior. To determine the global buildup of manmade fluorocarbons and chlorocarbons in Antarctica, a team of scientists collected air and snow samples at the Pole and in the McMurdo area.

In addition to the wide-ranging U.S. research efforts, the Soviet Union, Argentina, Great Britain, Australia, Chile, Japan, France, Poland, South Africa, and New Zealand are conducting scientific investigations in Antarctica. American scientists work with their colleagues from other nations in major research projects. The ferment of scientific activity in the Antarctic today is, in part, a result of that electrifying moment some 50 years ago when Admiral Byrd and his companions became the first to fly over the South Pole. ☐

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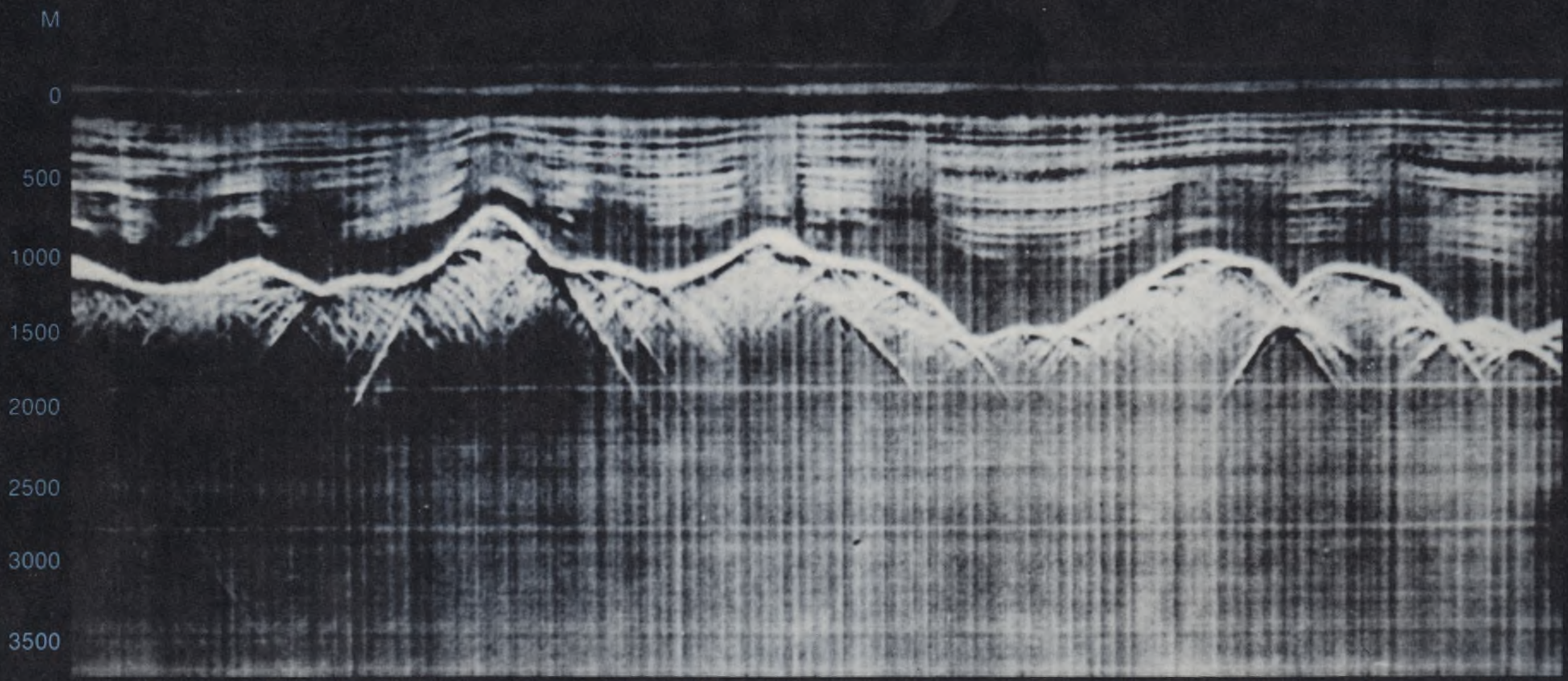

This record, made by airborne radar ice-sounding equipment, shows the ice surface (top), layers of ice, and the surface of mountains buried beneath hundreds of feet of ice in Antarctica.

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